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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte WILLIAM P. STEARNS and NOZAR HASSANZADEH

Appeal 2008-5643
Application 09/678,318
Technology Center 2800

Decided: January 9, 2009

Before JOSEPH F. RUGGIERO, MAHSHID D. SAADAT, and KEVIN F. TURNER, *Administrative Patent Judges*.

TURNER, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

Appellants appeal under 35 U.S.C. § 134 from the Final Rejection of claims 1-8 and 20-27. We have jurisdiction under 35 U.S.C. § 6(b). We affirm.

Appellants' claimed invention relates to methods of laying out traces on a substrate and the layout for connection of a semiconductor chip to a printed wiring board. (Spec. 1:11-12).

Independent claim 1 is illustrative of the invention and reads as follows:

> 1. A method of laying out traces for connection of bond pads of a semiconductor chip to a ball grid array disposed on a substrate, which comprises the steps of:
>
> (a) providing a substrate having a surface with a plurality of rows and columns of ball pads and having a solder ball secured to each of said ball pads; and
>
> (b) providing a plurality of pairs of traces on said surface, each trace of each of said pairs of traces extending to a different one of said ball pads and extending to ball pads on a plurality of said rows and columns, each trace of each of said pair of traces being spaced from the other trace of said pair by up to a ball pitch, being maximized for identity in length and having up to one ball pitch difference in length and being maximized for parallelism and spacing.

(App. Br. 7, Claims Appendix)

The Examiner relies on the following prior art references to show unpatentability:

Karnezos	US 5,409,865	Apr. 25, 1995
Ohsawa	US 2001/0014491 A1	Aug. 16, 2001 (filed Oct. 8, 1999)

Claims 1, 2, 20, and 21 stand rejected under 35 U.S.C. § 102(a) as being anticipated by Ohsawa.

Claims 3, 4, 22, and 23 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Ohsawa.

Claims 5-8 and 24-27 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Ohsawa and Karnezos.

Claims 1-8 and 19-28 are pending in the application, where claims 19 and 28 were objected to as being dependent on rejected base claims but containing allowable subject matter.

The present appeal has a long procedural posture as described below:

Filing/Mailing Date	Paper
Apr. 5, 2002	Appeal Brief (App. Br.)
May 21, 2003	Examiner's Answer (Ex. Ans.)
June 18, 2003	Reply Brief (Reply Br.)
July 29, 2004	First Panel Remand {to clarify rejection}
Aug. 20, 2004	First Supplemental Ex. Ans. (1st Supp. Ex. Ans.)
Sep. 27, 2004	1st Supp. Reply Br.
May 26, 2005	Procedural Remand {to correct error}
Jun. 28, 2005	Communication from Examiner
Jul. 25, 2005	Appellants' Reply to Communication
Nov. 9, 2006	Procedural Remand {to consider IDS}
May 11, 2007	Second Panel Remand {further clarification}
May 31, 2007	Appellant's Response to Remand
Sep. 27, 2007	2nd Supp. Ex. Ans.
Nov. 1, 2007	Reply to 2nd Supp. Ex. Ans.
Feb. 7, 2008	3rd Supp. Ex. Ans.
Mar. 31, 2008	Reply to 3rd Supp. Ex. Ans.

Throughout, Appellants' arguments have essentially been that Ohsawa fails to disclose all of the elements of claim 1. More specifically, Appellants have argued that Ohsawa fails to teach that each trace of a differential wiring pair has a pitch less than or equal to a ball pitch, nor that the traces are maximized for parallelism, equality of length, and equality of cross-sectional geometry. (Appellant's Response to Remand 2). Appellants allege that Ohsawa fails to disclose such relations between traces and that Fig. 3J of Ohsawa cannot be relied upon to teach the same. (Reply to 2nd Supp. Ex. Ans. 2-3).

The Examiner's original rejection and subsequent clarifications have been equally consistent in finding that the traces illustrated in Fig. 3J of Ohsawa teach the relationships between the traces recited in claim 1. (2nd Supp. Ex. Ans. 8-10). Appellants have not emphasized the differences between the applied art and the dependent claims 2-28, other than merely stating that specific elements are not taught, without further explanation. (App. Br. 4-6).

Rather than reiterate the arguments of Appellants and the Examiner, reference is made to the Briefs and Answer for the respective details. Only those arguments actually made by Appellants have been considered in this decision. Arguments which Appellants could have made but chose not to make in the Briefs have not been considered and are deemed to be waived. *See 37* C.F.R. § 41.37(c)(1)(vii).

ISSUES

(i) Under 35 U.S.C. § 102(b), with respect to appealed claims 1, 2, 20, and 21, does Ohsawa disclose teach that each trace of a differential wiring pair has a pitch less than or equal to a ball pitch, that the traces are maximized for parallelism, equality of length, and equality of cross-sectional geometry?

(ii) Under 35 U.S.C. § 103(a), with respect to appealed claims 2, 5, and 9, would one of ordinary skill in the art at the time of the invention have found it obvious to modify Ohsawa to render the claimed invention unpatentable?

(iii) Under 35 U.S.C. § 103(a), with respect to appealed claims 3 and 4, would one of ordinary skill in the art at the time of the invention have

found it obvious to combine Ohsawa and Karnezos to render the claimed invention unpatentable?

FINDINGS OF FACT

1. Independent claim 1 recites, in part, "each trace of each of said pairs of traces extending to a different one of said ball pads and extending to ball pads on a plurality of said rows and columns, each trace of each of said pair of traces being spaced from the other trace of said pair by up to a ball pitch, being maximized for identity in length and having up to one ball pitch difference in length and being maximized for parallelism and spacing."

2. The cited portion of claim 1 is described in the Specification in conjunction with Figures 3 and 4, where: "the path traversed by each trace 9 of each differential wiring pair is adjusted to have a pitch or distance therebetween from trace center line to trace center line of up to one solder ball 13 pitch, to be parallel to each for the maximum possible distance, [and] to each be as close as possible to the same length." (Spec. 8: 3-6; Figs. 3 & 4).

3. We find the claim term "spaced from the other trace of said pair by up to a ball pitch" to require that the traces may have a small spacing, extending up to a spacing that is less than the ball pitch. We find the limitation "being maximized for identity in length" as an aspirational requirement that seeks to make the lengths of the traces the same, but takes into account the specifics of the geometry. Any differences in length should be less than the ball pitch. We further find "being maximized for parallelism and spacing" as another aspirational requirement that seeks to keep the traces as parallel as the geometry of the connections allow.

4. Ohsawa is directed to lead frames and manufacturing methods thereof, where inner leads connect to electrodes of the semiconductor chip and the outer leads connect to electrodes of a printed circuit board. (Abstract; ¶ [0002]).

5. In Ohsawa, Figures 3A- 3K illustrates a lead frame structure that is used to form the connections. Fig. 3J, reproduced below, illustrates the penultimate step of the process, with specific attributes of the leads shown.

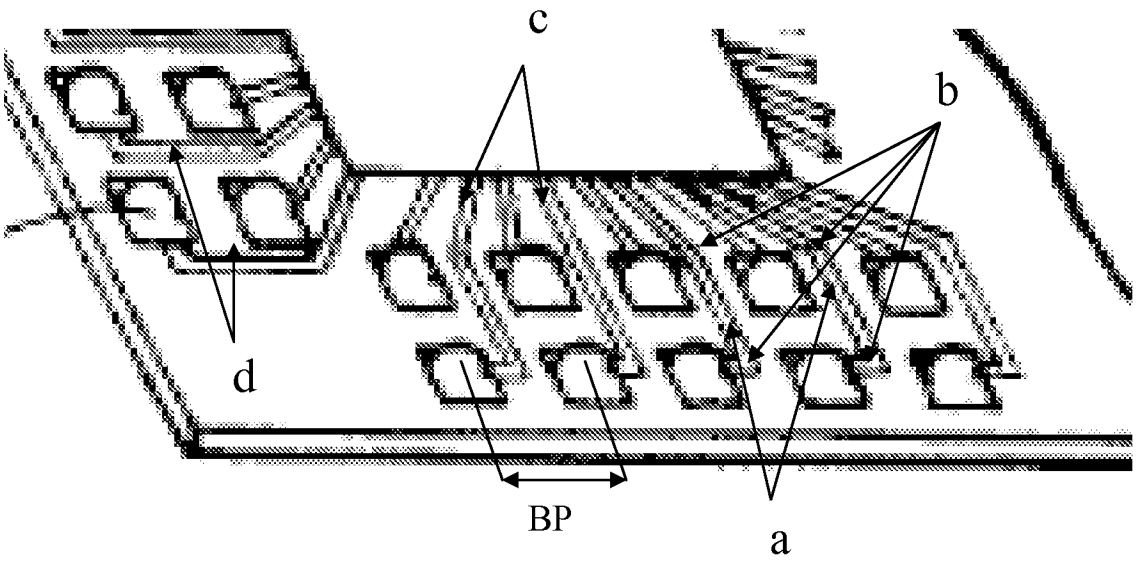

Fig. 3J depicts sections of a lead frame with annotations pointing out specific aspects of the traces thereon.

6. The designation "BP" in the above reproduced Figure 3J indicates a ball pitch and provided the distance from any point on one ball to the corresponding point on an adjacent ball, measured parallel to an axis of the balls.

7. Designation "a" illustrates a pair of traces which are parallel to each other and largely having the same length. The designation "b"

illustrates a portion of the traces where they are parallel to each other and have the same approximate length.

8. The designation "c" illustrates portions of the pairs of traces which are not parallel but have a difference in length that is less than the ball pitch. Designation "d" illustrates another pair of traces which exhibit the above-described attributes of the traces in the figure.

9. Ohsawa discloses that element "h" in Figure 1 is a printed circuit board. (¶ [0006]; Fig. 1).

10. Karnezos discloses a process for assembling a TAB grid array package which allows for connection of a semiconductor die to an external printed circuit board. In one embodiment, the die and the TAB tape are attached to a stiffener, where the stiffener provides mechanical rigidity and efficiently removes dissipated power. (Abstract).

PRINCIPLES OF LAW

"A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros., Inc. v. Union Oil Co.*, 814 F.2d 628, 631 (Fed. Cir. 1987). In rejecting claims under 35 U.S.C. § 103, it is incumbent upon the Examiner to establish a factual basis to support the legal conclusion of obviousness. *See In re Fine*, 837 F.2d 1071, 1073 (Fed. Cir. 1988).

> [T]here must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness') . . . [H]owever, the analysis need not seek out precise teachings directed to the specific subject matter of the challenged claim, for a court can take account of the inferences and creative steps that a person of ordinary skill in the art would employ.

KSR Int'l Co. v. Teleflex Inc., 127 S. Ct. 1727, 1741 (2007) (quoting *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006)).

During examination, the claims must be interpreted as broadly as their terms reasonably allow. *In re Am. Acad. of Sci. Tech Center*, 367 F.3d 1359, 1369 (Fed. Cir. 2004). When the specification states the meaning that a term in the claim is intended to have, the claim is examined using that meaning, in order to achieve a complete exploration of the applicant's invention and its relation to the prior art. *In re Zletz*, 893 F.2d 319, 321-22 (Fed. Cir. 1989). "Even when guidance is not provided in explicit definitional format, the specification may define claim terms by implication such that the meaning may be found in or ascertained by a reading of the patent documents." *Phillips v. AWH Corp.*, 415 F.3d 1303, 1321 (Fed. Cir. 2005) (citations and internal quotation marks omitted).

ANALYSIS

I. Anticipation by Ohsawa

Claims 1, 2, 20, and 21

Appellants argue that the final step of claim 1 is neither taught nor suggested by Ohsawa. (App. Br. 4; Reply Br. 2). Specifically, Appellants argue that Ohsawa does not disclose pairs of traces with traces of each pairs spaced from each other by up to a ball pitch, nor traces maximized for length identity with a difference up to one ball pitch, nor traces maximized for parallelism and spacing. Appellants argue that Ohsawa provides no discussion in its specification of traces having properties as recited in claim 1. (Reply Br. 2; 1st Supp. Reply Br. 2). However, as Appellants are well aware, the disclosure relied upon in a rejection need not come from the

specification and can come solely from the drawings thereof. *In re Mraz*, 455 F.2d 1069 (CCPA 1972).

Appellants do not find the drawings of Ohsawa as providing the disclosure that the Examiner has found. Appellants state: "[a]s to the drawings, the alleged dimensions concocted by the examiner are a figment of his imagination and not supported by the drawings." (1st Supp. Reply Br. 2). Appellants also find that since the drawings are not drawn to scale, they cannot be used to provide particular sizes. (Appellants' Resp. to Remand 3-4).

We do not disagree with Appellants to the degree that specific dimensions may not be specifically deduced from Fig. 3J of Ohsawa, but the recitations of claim 1 do not require specific dimensions to be measured with specificity. With respect to the recitations of claim 1, Fig. 3J of Ohsawa clearly illustrates a ball pitch, (FF. 6), to which Appellants do not disagree. (Reply to 2nd Supp. Ex. Ans. 2). The same figure provides for traces which are largely parallel, (FF. 7), and traces having differences in length of less than a ball pitch, (FF. 8). If, for example, claim 1 were to recite that the traces are parallel to each other over a specified percentage of their lengths, such a specific finding could not perhaps be cogently derived from Fig. 3J. In the instant case, however, the requirements of traces in claim 1 do not require such a level of specificity. (FF. 3). Given the actual requirements of claim 1, we find that the traces illustrated in Fig. 3J disclose pairs of traces with traces of each pairs spaced from each other by up to a ball pitch, traces maximized for length identity with a difference up to one ball pitch, and traces which are largely parallel.

Appellants also argue that there is nothing in Ohsawa which reasonably appears to disclose a pair of traces whose spacing is not greater that the ball pitch. (Appellants' Response to Remand 3). However, we agree with the Examiner, (2nd Supp. Ex. Ans. 9-10), that Fig. 3J can be relied upon for what it illustrates. Both Appellants and the Examiner can find a representation of a length of a ball pitch from Fig. 3J and it is reasonable to conclude a general spacing of traces in proportion to that represented length. We generally agree with the Examiner that "[t]o argue that figures cannot be used for what they reasonably show, including relative structural relationships, robs the figures of any probative value." (2nd Supp. Ex. Ans. 10).

Appellants also argue that there are not a plurality of pairs of traces illustrated and that the "traces in the figure appear to traverse toward the central portion of the base each at a different angle," and thus there is no parallelism or maximization as to identity in length. (Appellants' Response to Remand 3-4). We note that Fig. 3J does provide for a plurality of pairs of traces, (FF. 8), and that claim 1 does not require an absolute amount of parallelism or identity of length, but rather maximization thereof. (FF. 3). Given the structure of the lead frame illustrated in Fig. 3J, we find that the requirements of claim 1 are met by that figure.

In addition, Appellants argue that the reasons for allowance, made in a parent application, rely on the same language of claim 1 that is being interpreted in this case. (App. Br. 4). However, as Appellants note, that allowance was made with respect to "Lee et al." and Ohsawa was not considered therein. As such, the prior allowance of that claim language does not impact any evaluation of whether Ohsawa teaches such an element.

Appellants also argue that the rejection does not properly rely on the definition of "traces" as provided in the Specification, (3: 2-3). (Reply to 2nd Supp. Ex. Ans. 2). We reject, however, the contention that the Specification defines "traces" as carrying the same or similar signals which are out of phase with each other. Such a definition would confine the term "trace" to its intended use in one embodiment described and we find such a definition does not comport with the general use of the term, such as "[t]he layout of the circuitry and especially the traces 9 materially affect the performance of the chip, this being particularly material in the case of differential wiring pairs." (Spec. 7:21 – 8:2). As such, we do not find that the Examiner has relied upon an improper definition in making rejection over Ohsawa.

Appellants also argue that the Examiner's explanations of the subject matter of Ohsawa in response to the remands constitute a new ground of rejection. (Reply to 2nd Supp. Ex. Ans. 3-4). As discussed above, we accept the Examiner's further explanation as providing greater clarity to the sections of Ohsawa relied upon in the rejections and do not find that the further explanations provide a new ground of rejection.

In addition, Appellants also argue that Ohsawa fails to teach that the traces are maximized for identity in cross-sectional geometry as recited in claim 2. (App. Br. 4). Per the Examiner's rejection, we find that the traces illustrated in Ohsawa have the same cross-sectional geometry. Further to the discussion above, we need not make actual measurements from the drawings to arrive at relationships between elements in the drawings that are self-evident. As such, we find no error in the Examiner's rejection of claims 1, 2, 20 and 21 as being anticipated by Ohsawa.

II. Obviousness over Ohsawa

Claims 3, 4, 22, and 23

Appellants argue that claims 3, 4, 22, and 23 are allowable over Ohsawa for at least their dependence on claim 1. (App. Br. 5). Since we do not find any error in the rejection of claim 1, their dependence does not impact their rejection over Ohsawa. Additionally, Appellants argue that application of a differential signal to at least one pair of traces is not taught by Ohsawa, as recited in claims 3 and 4. (App. Br. 5). However, the Examiner does not rely on subject matter in Ohsawa to reject claims 3 and 4, but rather finds that the application of differential signal pairs is well known in the art. (2nd Supp. Ex. Ans. 4). Given the Examiner's findings and the motivation supplied to modify Ohsawa, we find no error in the rejection of claims 2 and 3. In addition, we note that the subject matter of claims 3 and 4 does not comport with the method espoused by claim 1, namely "laying out traces," and appears to be a suggested use of the traces once they have been defined. Appellants also argues that claims 22 and 23 recite that the substrate is a printed wiring board, which is neither taught nor suggested by Ohsawa. (App. Br. 5). However, the Examiner finds Ohsawa to teach printed wiring boards inherently, (2nd Supp. Ex. Ans. 4), and given Ohsawa's disclosure, (FF. 9), we find no error in the Examiner's rejection.

III. Obviousness over Ohsawa and Karnezos

Claims 5-8 and 24-27

Appellants argue that claims 5-8 and 24-27 are allowable over Ohsawa and Karnezos for at least their dependence on claim 1. (App. Br. 5). Since we do not find any error in the rejection of claim 1, their dependence

does not impact their rejection over Ohsawa and Karnezos. Additionally, Appellants argue that claims 5-8 recite that a further surface insulated from the surface and the traces being disposed on that further surface and that Ohsawa and Karnezos do not teach or suggest such limitations. (App. Br. 5). However, we agree with the Examiner that Karnezos discloses a further surface, (2nd Supp. Ex. Ans. 4; FF. 10), and that it would have been obvious to have modified Ohsawa in view of Karnezos. Appellants also argues that claims 24-27 recite that the substrate is a printed wiring board, which is neither taught nor suggested by Ohsawa. (App. Br. 6). However, the Examiner finds Ohsawa to teach printed wiring boards inherently, (2nd Supp. Ex. Ans. 4), and given Ohsawa's disclosure, (FF. 9), we find no error in the Examiner's rejection.

CONCLUSION

The decision of the Examiner rejecting claim 1, 2, 20, and 21 under 35 U.S.C. § 102(a) based on Ohsawa, rejecting claims 3, 4, 22, and 23 under 35 U.S.C. § 103(a) as being unpatentable over Ohsawa, and rejecting claims 5-8 and 24-27 under 35 U.S.C. § 103(a) as being unpatentable over Ohsawa and Karnezos, is affirmed.

DECISION

The Examiner's rejections of claims 1-8 and 20-27 before us on appeal are affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a).

AFFIRMED

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